REMARKS

By this amendment, Applicants have amended claims 1 and 8 to include the features of claim 2 that the threshold temperature is between 170°C and 250°C. Claim 2 has been canceled without disclaimer and Applicants reserve the right to pursue this claim in a continuation application. This amendment does not add new matter and Applicants respectfully request entry of the amendment and allowance of the pending claims.

Rejection under 35 U.S.C. §112, Second Paragraph

The Examiner rejected claim 1 because of the phrase "the exhaust gas" and claim 8 because of the phrase "the air/fuel ratio" lacks antecedent basis. In response, Applicants have amended claims 1 and 8 to include antecedent basis for these phrases. Accordingly. Applicants request reconsideration and withdrawal of the rejections based on 35 U.S.C. §112, second paragraph.

Rejections Under 35 U.S.C. § 103(a)

The Examiner rejects claims 1-12 under 35 U.S.C. §103(a) as being allegedly unpatentable over U.S. Patent No. 6,419,890 (Li). Applicants respectfully traverse this rejection.

To establish obviousness of the claims, all claim features must be taught or suggested by the prior art. The Examiner alleges that Li renders the present claims obvious because Li discloses a process for regeneration of a diesel engine NOx catalyst by regenerating with rich pulses at moderate temperature. Applicants respectfully disagree with this interpretation and submit that Li does not disclose, teach or suggest regenerating a NOx storage catalyst using a rich pulse when the exhaust gas temperature is above 170°C to 250°C and then pulsed regeneration (e.g., lean pulses and rich pulses) when the exhaust gas temperature is below the threshold temperature of 170°C to 250°C as currently claimed. Rather, the only time that Li discloses pulsed regeneration is at temperatures of 550°C:

> The sulfur tolerant NOx trap catalyst composites of the present invention can be **regenerated with rich pulses at moderate temperatures (550°C).**

(Li col. 8, lines 41-43, emphasis added). See Li also at Figures 2-6. Li is silent on pulsed regeneration at temperatures below 170°C to 250°C.

The entire disclosure of Li is directed to the serious problem of sulfur poisoning of the NOx trap catalyst, when sulfur-containing fuels are used. In exhaust gas, sulfur is in the form of sulfur dioxide, which gets oxidized by the NOx trap to sulfur trioxide, which in turn is trapped by the NOx trap in the form of firmly bonded sulfates. This reaction is concurrent and in competition with trapping nitrogen oxides in the exhaust gas (in the form of nitrates). To restore the nitrogen oxides storage capacity, the NOx trap therefore has to be de-sulfated and de-nitrated frequently. According to Li, conventional de-sulfation requires impractically high temperatures above 650°C at rich stoichiometry (col. 8, lines 36-38) because of the high binding energy of sulfates. Li's solved this problem by designing a NOx trap catalyst that undergoes de-sulfation at 550°C while de-nitration can be performed within the normal operation window of the NOx-trap between 150°C and 450°C (Li col. 8, lines 60-62).

One of ordinary skill in the art on reading the entire disclosure of Li would understand that Li does not distinguish between de-sulfation and de-nitration that is he groups both processes under the term "regeneration". By using rich pulses, Li's invention is that he could lower the temperature for de-sulfation to "moderate" temperatures of 550°C.

In contrast to Li, Applicants find that at exhaust gas temperatures below a threshold temperature (170°C to 250°C), de-nitration of NOx storage catalyst is not complete within normal de-nitration periods (e.g., 5 to 20 seconds). Applicants also find that pulsed regeneration (de-nitration) may be used to heat up the NOx storage catalyst considerably improving regeneration (see, for example, the specification at page 7, lines 21-27 and Example 1). Therefore, there are two different regeneration strategies employed by the presently claimed invention, depending on the exhaust gas temperature: 1) multi-pulse regeneration when the exhaust gas is below a threshold temperature of between 170°C to 250°C and 2) above the threshold temperature range where de-nitration (regeneration) occurs with, for example, one rich pulse (e.g., 5 to 20 seconds). Li does not recognize the problem that de-nitration below170°C to 250°C is not complete and that exhaust gas temperatures below 170°C to 250°C would require special attention and pulsed regeneration as currently claimed.

In summary, Li does not disclose, teach or suggest the features of two regeneration strategies of a rich pulse above the threshold temperature of 170°C to 250°C and multi-pulses below the threshold temperature 170°C to 250°C to regenerate the catalyst as presently claimed. Li is trying to solve a different problem of sulfur poisoning of the NOx trap catalyst and not de-nitration of the catalyst as recognized by the presently claimed invention. Thus, Applicants respectfully request reconsideration and withdrawal of the obviousness rejection.

Pursuant to 37 CFR 1.136(a), an extension of time of **3** month is hereby requested. A check in the amount of **$1020.00** is enclosed to cover the fee for the extension of time. If any additional fees are due or any overpayment has been made, please charge our Deposit Account No. 11-0171 or credit our Deposit account for such sum.

If the Examiner has any questions regarding the present application, the Examiner is cordially invited to contact Applicants' attorney at the telephone number provided below.

Respectfully submitted,

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